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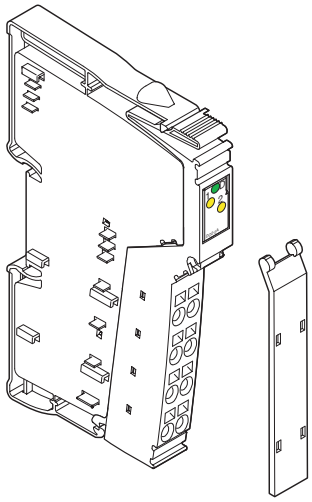
IB IL 24 DO 2-2A ...



Inline Terminal With Two Digital Outputs

AUTOMATIONWORX

Data Sheet
5556_en_03

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Description

The terminal is designed for use within an Inline station. It is used to output digital signals.

Features

- Connections for two digital actuators
- Connection of actuators in 2, 3, and 4-wire technology
- Nominal current per output: 2 A
- Total current of the terminal: 4 A
- Short-circuit and overload protected outputs
- Diagnostic and status indicators
- Approved for the use in potentially explosive areas (observe the notes on page 7)
- **IB IL 24 DO 2-2A and IB IL 24 DO 2-2A-PAC:** Approved for use within a safety-related segment circuit (observe the notes on page 6)

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This data sheet is only valid in association with the IL SYS INST UM E user manual or the Inline system manual for your bus system.

Make sure you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

This data sheet is valid for the products listed on the following page:

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Ordering Data

Products

Description	Type	Order No.	Pcs./Pkt.
Terminal with two digital outputs; complete with accessories (connector and labeling field); transmission speed of 500 kbps	IB IL 24 DO 2-2A-PAC	2861263	1
Terminal with two digital outputs; without accessories; transmission speed of 500 kbps	IB IL 24 DO 2-2A	2726243	1
Terminal with two digital outputs; complete with accessories (connector and labeling field); transmission speed of 2 Mbps	IB IL 24 DO 2-2A-2MBD-PAC	2861700	1
Terminal with two digital outputs; without accessories; transmission speed of 2 Mbps	IB IL 24 DO 2-2A-2MBD	2861700	1

One of the listed connectors is needed for the complete fitting of the IB IL 24 DO 2-2A and IB IL 24 DO 2-2A-2MBD terminals.

Accessories

Description	Type	Order No.	Pcs./Pkt.
Connector with eight spring-cage connections (green, w/o color print)	IB IL SCN-8	2726337	10
Connector with eight spring-cage connections (green, with color print)	IB IL SCN-8-CP	2727608	10

Documentation

Description	Type	Order No.	Pcs./Pkt.
"Configuring and Installing the INTERBUS Inline Product Range" user manual	IB IL SYS PRO UM E	2743048	1
"Automation Terminals of the Inline Product Range" user manual	IL SYS INST UM E	2698737	1
"INTERBUS Addressing" data sheet	DB GB IBS SYS ADDRESS	9000990	1
"Inline Terminals for Use in Zone 2 Potentially Explosive Areas" application note	AH EN IL EX ZONE 2	7217	1
"Safety-Related Segment Circuit" application note	AH EN IL SAFE	7195	1

Technical Data

General Data	
Housing dimensions (width x height x depth)	12.2 mm x 120 mm x 71.5 mm
Weight	46 g (without connector), 61 g (with connector)
Operating mode	Process data mode with 2 bits
Connection method for actuators	2, 3, and 4-wire technology
Permissible temperature (operation)	-25°C to +55°C
Permissible temperature (storage/transport)	-25°C to +85°C
Permissible humidity (operation/storage/transport)	10% to 95% according to DIN EN 61131-2
Permissible air pressure (operation/storage/transport)	70 kPa to 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20 according to IEC 60529
Class of protection	Class 3 according to EN 61131-2, IEC 61131-2
Connection data for connectors	
Connection type	Spring-cage terminals
Conductor cross-section	0.2 mm^2 to 1.5 mm^2 (solid or stranded), 24 - 16 AWG

Interface	
Local bus	Through data routing

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Transmission Speed	
IB IL 24 DO 2-2A-PAC, IB IL 24 DO 2-2A	500 kbps
IB IL 24 DO 2-2A-2MBD-PAC, IB IL 24 DO 2-2A-2MBD	2 Mbps

Supply of the Module Electronics and I/O Through Bus Terminal/Power Terminal	
Connection method	Via potential routing

Power Consumption	500 kbps	2 Mbps
Communications power	7.5 V	7.5 V
Current consumption from the local bus	35 mA, maximum	60 mA, maximum
Power consumption from the local bus	0.27 W, maximum	0.45 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)	24 V DC (nominal value)
Nominal current consumption at U_S	4 A (2 x 2 A), maximum	4 A (2 x 2 A), maximum

Digital Outputs	
Number	2
Nominal output voltage U_{OUT}	24 V DC
Differential voltage for I_{nom}	≤ 1 V
Nominal current I_{nom} per channel	2 A
Tolerance of the nominal current	+10%
Total current	4 A
Protection	Short circuit; overload
Nominal load	
Ohmic	12 Ω / 48 W
Lamp	48 W
Inductive	48 VA (1.2 H, 50 Ω)
Signal delay upon power up of:	
Nominal ohmic load	200 µs, approximately
Nominal lamp load	200 ms, typical (with switching frequencies up to 8 Hz; above this frequency the lamp load responds like an ohmic load)
Nominal inductive load	250 ms (1.2 H, 12 Ω), approximately
Signal delay upon power down of:	
Nominal ohmic load	200 µs, approximately
Nominal lamp load	200 µs, approximately
Nominal inductive load	250 ms (1.2 H, 12 Ω), approximately
Switching frequency with	
Nominal ohmic load	300 Hz, maximum

This switching frequency is limited by the selected data rate, the number of bus devices, the bus structure, the software and the control or computer system used.

Nominal lamp load	300 Hz, maximum

This switching frequency is limited by the selected data rate, the number of bus devices, the bus structure, the software and the control or computer system used.

Nominal inductive load	0.5 Hz (1.2 H, 12 Ω), maximum
Overload response	Auto restart
Response with inductive overload	Output may be damaged
Reverse voltage protection against short pulses	Protected against reverse voltages
Resistance to permanently applied reverse voltages	Up to 2 A DC
Validity of output data after connecting the 24 V supply voltage (power up)	5 ms, typical
Response upon power down	The output follows the supply voltage without delay.

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Digital Outputs (Continued)	
Limitation of the voltage induced on circuit interruption	-0.7 V, approximately
Maximum inductive breaking energy/channel	1500 W (8/20 µs pulse)
Type of external protective circuit	Free-wheeling diode per channel

Output Characteristic Curve When Switched On (Typical)

Output Current (A)	Differential Output Voltage (V)	
	500 kbps	2 Mbps
0	0	0
0.2	0.02	0.013
0.4	0.04	0.026
0.6	0.06	0.039
0.8	0.08	0.053
1.0	0.10	0.066
1.2	0.12	0.079
1.4	0.14	0.093
1.6	0.16	0.107
1.8	0.18	0.122
2.0	0.20	0.136
2.2	0.22	

Power Dissipation

Formulas to Calculate the Power Dissipation of the Electronics

500 kbps

$$P_{EL} = 0.18\ W + \sum_{n=1}^{2} (200\ mW + I_{Ln}^2 \times 0.1\ \Omega)$$

2 Mbps

$$P_{EL} = 0.40\ W + \sum_{n=1}^{2} (35\ mW + I_{Ln}^2 \times 0.075\ \Omega)$$

Where

P_{EL}	Total power dissipation in the terminal
n	Index of the number of set outputs n = 1 to 2
IL_n	Load current of the output n

Power Dissipation of the Housing Depending on the Ambient Temperature

500 kbps

$P_{HOU} = 2.4\ W$ $\quad -25°C < T_A \leq -5°C$

$$P_{HOU} = 2.4\ W - \frac{T_A - (-5°C)}{37.5\ K/W} \quad -5°C < T_A \leq +55°C$$

2 Mbps

0.6 W (within the permissible operating temperature)

Where

P_{HOU}	Power dissipation of the housing
T_A	Ambient temperature

Limitation of Simultaneity, Derating (Speed: 500 kbps)

Ambient Temperature (TA)	Maximum Load Current at 100% Simultaneity	Maximum Load Current at 50% Simultaneity
55°C	1 A	2 A
40°C	2 A	2 A

With an ambient operating temperature of 55°C and 100% simultaneity, a load current of 1 A per channel is permissible. If only one channel is used (50% simultaneity), a load current of 2 A can be tapped. With an ambient temperature of 40°C, a maximum load current of 2.0 A can be tapped in both cases.

If both channels are used, the permissible working point must be defined according to the above formulas. For an example, please refer to the IB IL SYS PRO UM E user manual or the Inline system manual for your bus system.

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Limitation of Simultaneity, Derating (Speed: 2 Mbps)

Ambient Temperature (TA)	Maximum Load Current at 100% Simultaneity	Maximum Load Current at 50% Simultaneity
55°C	0.7 A	1.2 A
35°C	2 A	2 A

With an ambient operating temperature of 55°C and 100% simultaneity, a load current of 0.7 A per channel is permissible. If only one channel is used (50% simultaneity), a load current of 2 A can be tapped. With an ambient temperature of 35°C, a maximum load current of 2.0 A can be tapped in both cases.

If both channels are used, the permissible working point must be defined according to the above formulas. For an example, please refer to the IB IL SYS PRO UM E user manual or the Inline system manual for your bus system.

Safety Equipment

Overload/short circuit in segment circuit	Electronic
Surge voltage	Protective elements in the power terminal
Polarity reversal	Protective elements in the power terminal

Electrical Isolation/Isolation of the Voltage Areas

To provide electrical isolation between the logic level and the I/O area it is necessary to supply the station bus coupler and the digital output terminal described here via the bus coupler or a power terminal from separate power supply units. Interconnection of the power supply units in the 24 V area is not permitted. (See also user manual.)

Common Potentials

The 24 V main voltage, 24 V segment voltage, and GND have the same potential. FE is a separate potential area.

Separate Potentials in the System Consisting of Bus Terminal Module/Power Terminal and I/O Terminal

Test Distance	Test Voltage
5 V supply incoming remote bus/7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min
5 V supply outgoing remote bus/7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min
7.5 V supply (bus logic) / 24 V supply (I/O)	500 V AC, 50 Hz, 1 min
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min

Error Messages to the Higher-Level Control or Computer System

Short circuit/overload of an output	Yes

An error message is generated when an output is shorted and switched on. In addition, the diagnostic LED (D) flashes on the terminal at 2 Hz (medium) under these conditions.

Falling below or exceeding the operating voltage	No

Approvals

For the latest approvals, please visit www.download.phoenixcontact.com or www.eshop.phoenixcontact.com.

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Local Diagnostic and Status Indicators and Terminal Point Assignment

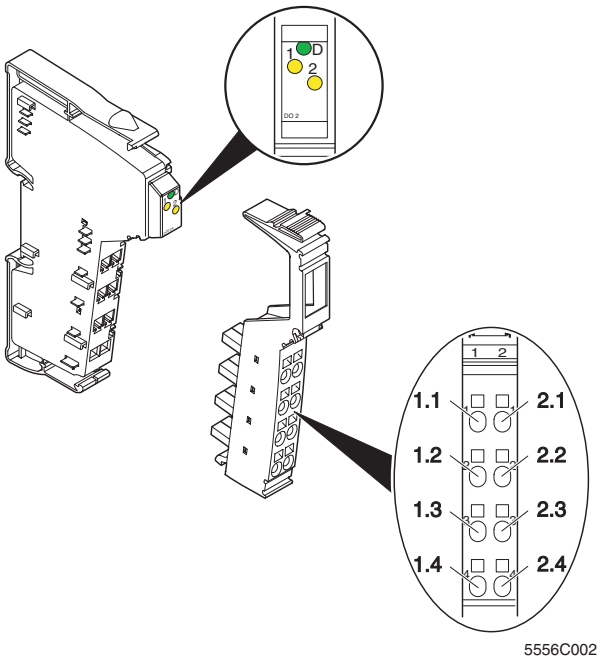

Figure 1 IB IL 24 DO 2-2A with the appropriate connector

Local Diagnostic and Status Indicators

Des.	Color	Meaning
D	Green	Diagnostics
1, 2	Yellow	Status indicators of the outputs

Function Identification

Pink

2MBD: White stripe in the vicinity of the D LED

Terminal Point Assignment

Terminal points	Assignment
1.1, 2.1	Signal output (OUT)
1.2, 2.2	Segment voltage U_S for 4-wire termination Measuring point for the supply voltage
1.3, 2.3	Ground contact (GND) for 2, 3, and 4-wire termination
1.4, 2.4	FE connection for 3 and 4-wire termination

Notes on Using the Terminals Within a Safety Segment Circuit

The terminals of the following hardware version and later (listed in the table below) are approved for use within a safety-related segment circuit.

Order No.	Order Designation	Hardware Version
2726243	IB IL 24 DO 2-2A	05
2861263	IB IL 24 DO 2-2A-PAC	05

The hardware version is marked on the side of the housing of every terminal (1 in Figure 2).

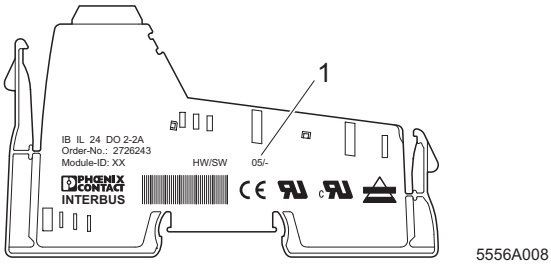

Figure 2 Labeling on an Inline terminal

The instructions in the current documentation for the safety terminal and from the AH EN IL SAFE application note must be observed to ensure that operation of the safety-related segment circuit is not adversely affected.

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Notes on Using the Terminal in Potentially Explosive Areas

Approval According to EC Directive 94/9 (ATEX)

II 3G Ex nAC IIC T4 X

This Inline terminal conforms to the requirements of protection type "n" and can be installed in a zone 2 potentially explosive area. This Inline terminal is a category 3G item of electrical equipment.

WARNING: Explosion hazard
Only Inline terminals that are approved for use in potentially explosive areas may be snapped next to this Inline terminal.

Before using an Inline terminal in a zone 2 potentially explosive area, check that the terminal has been approved for installation in this area.

For a list of terminals approved for zone 2 potentially explosive areas, please refer to the AH EN IL EX ZONE 2 application note.

Check the labeling on the Inline terminal and the packaging (see Figure 3).

Figure 3 Typical labeling of terminals for use in potentially explosive areas

WARNING: Explosion hazard

Before startup, ensure that the following points and instructions are observed.

1. When working on the Inline terminal, always disconnect the supply voltage.
2. The Inline terminal must only be installed, started up, and maintained by qualified specialist personnel.
3. Install the Inline terminals in a control cabinet or metal housing. The minimum requirement for both items is IP54 protection according to EN 60529.
4. The Inline terminal must not be subject to mechanical strain or thermal loads, which exceed the limits specified in the product documentation.
5. The Inline terminal must not be repaired by the user. Repairs may only be carried out by the manufacturer. The Inline terminal is to be replaced by an approved terminal of the same type.
6. Only category 3G equipment may be connected to Inline terminals in zone 2.
7. Observe all applicable standards and national safety and accident prevention regulations for installing and operating equipment.

Restrictions

WARNING: Explosion hazard

When using terminals in potentially explosive areas, observe the technical data and limit values specified in the corresponding documentation (user manual, data sheet, package slip).

WARNING: Explosion hazard
Restrictions regarding the Inline system

The **maximum permissible current** flowing through the potential jumpers U_M and U_S (total current) is limited to **4 A** when using the Inline terminal in potentially explosive areas.

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Internal Circuit Diagram

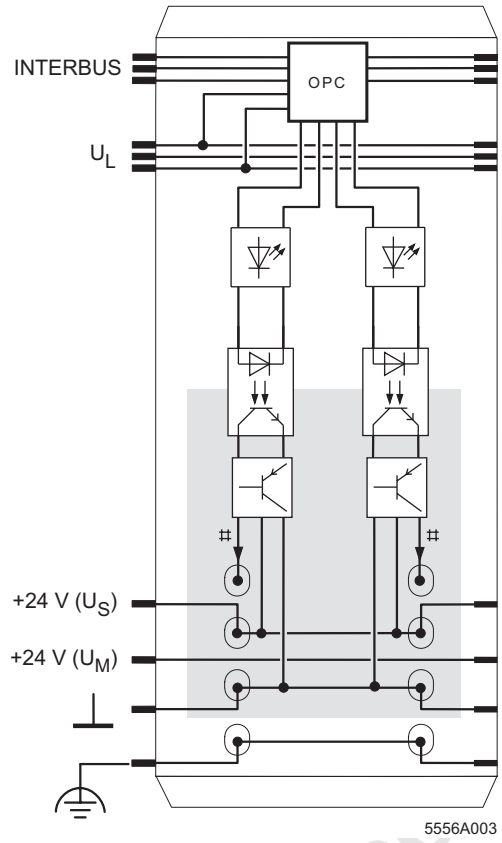

Figure 4 Internal wiring of the terminal points

Key:

OPC	Protocol chip (bus logic including voltage conditioning)
	LED
	Optocoupler
	Transistor
	Digital output
	Electrically isolated area

Other symbols used are explained in the IB IL SYS PRO UM E user manual or the system manual for your bus system.

Connection Example

When connecting the actuators observe the assignment of the terminal points to the process data, see page 9.

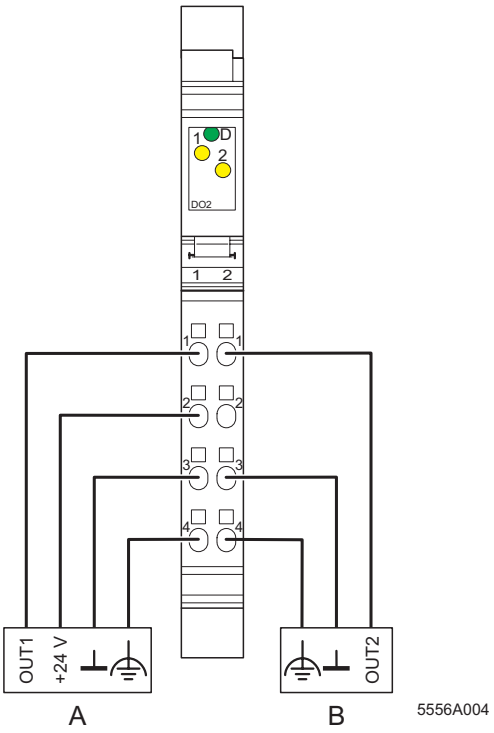

Figure 5 Typical actuator connection

A 4-wire termination
B 3-wire termination

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Programming Data/Configuration Data

Local Bus (INTERBUS)

ID code	BD_{hex} (189_{dec})
Length code	$C2_{hex}$
Process data channel	2 bits
Input address area	0 bits
Output address area	2 bits
Parameter channel (PCP)	0 bits
Register length (bus)	2 bits

Other Bus Systems

For the programming data/configuration data of other bus systems, please refer to the corresponding electronic device data sheet (GSD, EDS).

Process Data

Assignment of the OUT Process Data

(Byte.bit) view		0.1	0.0
Module	**Terminal point (signal)**	**2.1**	**1.1**
	Terminal point (+24 V)	2.2	1.2
	Terminal point (GND)	2.3	1.3
	Terminal point (FE)	2.4	1.4
Status indicators	LED	2	1

For the assignment of the illustrated (byte.bit) view to your **INTERBUS** control or computer system, please refer to the DB GB IBS SYS ADDRESS data sheet.

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